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Region 10 Timber Mgmt Plan
Plan 11
Tongass Nat. For.

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TIMBER MANAGEMENT PLAN

JUNEAU WORKING CIRCLE

TONGASS NATIONAL FOREST

1959 - 1968

FOREST SERVICE
U S
DEPARTMENT OF AGRICULTURE

FOREST SERVICE WASHINGTON, D.C.

Region 10 December 2, 1958

Richard E. McArdle, Chief, By

S-PLANS, Timber Management, Management Plans (Juneau Working Circle)

The approved management plan for the Juneau Working Circle, submitted with your memorandum of October 14, is returned. Enclosed also are copies of a review prepared in Timber Management. A copy of that review and of this memorandum should be bound in the front of each copy of the plan.

The region, including all of those who worked on the plan, are to be congratulated upon producing a clear, concise and logical plan. Used in conjunction with the Forest Plan for the Tongass, it should furnish an adequate guide for timber operation on the working circle during the current decade.

This working circle is dominated by the Georgia-Pacific Alaska Company sale and accomplishment of the plan must await the commencement of operations under that sale. The selection of a 110-year rotation and the general long-term scheduling of cutting on the working circle seem to be a logical solution to the question of sustained yield management on this particular area.

I am sure that you are fully aware of the importance of prompt and adequate regeneration on areas which are cut over under this plan. Of considerable importance also is the relationship between scaled volume and inventory volume. On these two points we would like to have you report on accomplishments on the Ketchikan Pulp Company sale. If you do not have adequate information available now, please schedule studies and operations for next field season so that you can give us a report approximately a year from now.

Reference is made to our memorandum of October 16, 1958 transmitting the approved Forest Plan for the Tongass. If you reproduce that plan and the Juneau Plan for public distribution, as suggested, you should insert at least tentative volume and area data in Table 1 (page 2) of the Forest Plan. The data for the Juneau Working Circle should be corrected in Table 1 to agree with the Juneau Plan and should be entered in Table 2 on page 3.

/s/ Edward P. Cliff

FOREST SERVICE WASHINGTON, D.C.

The Record December 1, 1958

L. S. Gross, Forester

S-PLANS, R-10, Timber Management, Management Plans (Juneau Working Circle)

I have reviewed the management plan for the Juneau Working Circle, submitted by Region 10 with memorandum of October 14, 1958.

This is a well-written plan. It is designed to guide timber management on the working circle for the current decade, in conjunction with the plan for the Tongass Forest, which was approved 10/16/58. The Juneau plan describes the present situation adequately and prescribes satisfactory timber management practices.

The working circle includes 3.8 million acres of which about 533 M acres is classified as accessible commercial national forest land with an allowable annual cut of 179.5 MM feet. This is the area subject to regulation of cut during the current plan period. The area of old-growth timber (475 M acres) is further broken down (page JA-3) into two volume classes (1) 16 M per acre and more, 420 M acres (88%); (2) 8-15.9 M feet per acre, 55.6M acres (12%). All of the 16 M plus stands are assumed to be operable under present conditions; some of the lighter stands may be inoperable but all are included in allowable cut calculations. In addition there is in the working circle some 224 M acres of commercial forest land presently classified as "inaccessible". The volume of old-growth sawtimber on this inaccessible area is about 6 billion feet, which is more than 8 times the volume of the "light" accessible stands. Neither the light (8M - 15.9 M) stands nor the "inaccessible" stands are delineated on the type and condition class maps. The region has maintained that there was too little cutting experience to make such delineations at this time. The management plan assumes, therefore, that the light stands will be cut as encountered, and specifies that any volume cut from areas classed as "inaccessible" during the current decade will be charged to the allowable cut. During this plan period those who administer the working circle should develop records and guides which can be used to distinguish on the ground and on the maps between operable and inoperable stands, whether based on volume per acre or on accessibility. At the time of the next revision, July 1, 1969, (inadvertently stated on page J-3 as July 1, 1959) areas judged to be inoperable should be delineated on the maps and considered in recalculating the allowable cut. To recapitulate, this plan deals with a stand of 15 billion feet of timber on an estimated 533 M acres of commercial forest land; some stands included in the calculation may be inoperable, but there is a much larger area and volume which may turn out to be operable

Technical Bulletin 412 "Yield of Second-Growth Western Hemlock-Sitka Spruce Stands in Southeastern Alaska" was used in calculating future growth, allowable cut and sustained yield capacity. Pertinent tables from this bulletin, converted to the Scribner Decimal C Log Rule, are contained in the appendix of the Forest plan. Site determinations were made by applying the average of permanent research plots to the area of the working circle. This determination will need to be checked in connection with future revisions of the plan. Taylor points out in T.B. 412 that no reliable method has been developed for determining site index in the over-mature stands which characterize this working circle. He also says "investigations by the writer show that old-growth stands when cut invariably are succeeded by even-aged forest having a far higher site index". The method used for determining rotation in this plan is geared to the assumed distribution of site quality on the working circle. This emphasizes the importance of checking site index during operations under this plan in order to provide more adequate information on which revisions may be based. The 110-year rotation developed is satisfactory for the initial plan for this working circle.

Allowable cut is developed by using Hanzlik's formula, which should be quite satisfactory for this plan. Particular attention is directed to the area-volume check for accessible commercial forest land (page JA-5). This shows that for the first approximately 80 years cutting will proceed at the rate of about 6 M acres per year, yielding a total volume of about 14 billion feet. In other words, existing old-growth stands will be liquidated in 80 years. Present second growth stands will be harvested over about a 17 year period and during the last 13 years of the first rotation intermediate cuts are planned on 60-80-year stands, plus harvest cuts on the highest site quality areas regenerated during the early part of the first rotation. This would not be premature cutting, since these highest site quality areas would have reached their rotation of 80 or 90 years by that time. This method of scheduling cutting may seem undesirable, since, in effect, it would result in getting over the commercial forest lands of the working circle in less than R years. There is a big safety factor--the 224 M acres containing 7 billion feet of timber on land now classed as "inaccessible". It is inevitable that a considerable portion of this inaccessible area will become accessible during the first rotation. Questions of defining and locating (on the ground and on the maps) lines of accessibility must be answered in the first or subsequent revisions of this plan. For the initial plan I believe that the solution recommended by the Region is satisfactory.

Present allowable cut is the equivalent of about 325 board feet per acre per year. Predicted sustained yield capacity (page J-3) is the equivalent of about 500 board feet per acre per year. In using the normal yield tables converted to Scribner Decimal C Rule (see Appendix of Forest plan) the planner applied a discount of 22%. Taylor suggests 11% discount for stocking. The other 11% is for defect and breakage. Thus the calculations are based on 78% of normal yield table values for stocking and growth.

* $AAC = I + \frac{V_m}{R}$

These figures can be checked only by future examinations of permanent growth plots. As in all other working circles, it is important that these permanent plots be reexamined periodically in order to build up a much more reliable fund of local growth information. For site index 110 the normal yield table shows a mean annual increment for R 110 of 673 board feet per acre; multiplied by 78% this becomes 525, which compares to the 500 board feet per acre per year predicted on page J-3.

A pertinent question which is not mentioned in the management plan is the comparison of scaled volume with inventory volume. The 11% reduction in the calculation of future yields, intended to cover defect and breakage has been discussed. The inventory provided for reductions for defect but I am not sure whether sufficient deductions were applied to cover logging waste. Inasmuch as the large sale on this working circle will not become active for at least a couple of years more, there will be no early opportunity for a real check of the comparison of scaled volume with inventory volume here. This comparison can be made on current operations of the Ketchikan Pulp Company sale on another working circle. I think the region should do this and report the results to us. There are indications that there is a significant reduction in Region 6 and we certainly should have some information on this subject regarding Region 10 timber.

Another point which needs to be emphasized is the assumption in the plan of prompt and complete regeneration following clear cutting of old-growth timber. The plan stresses the importance of direct seeding in the event of failure of natural regeneration and points to the possible need for measures to control undesirable hardwoods and brush which have a tendency to grow luxuriantly, particularly on the best sites. These are important matters and, again, experience gained on the Ketchikan Pulp Company sale should be applied to cuttings on the Juneau Working Circle.

Pages J-10 through J-14

The discussion of multiple-use provisions is exceptionally good.

Page J-17

The last two sentences in paragraph 4 are not very clear. There is an element of confusion in that one sentence refers to unadvertised sales and the next sentence, apparently talking about the same kind of sales, refers to advertised sales. If the plan is reproduced, I suggest that it would be desirable to clarify the meaning by recasting these two sentences.

On the same page, the policy of restricting cat yarding to areas where serious erosion and site damage are not likely to result is a good one and one which should be emphasized in planning and supervising operations under this plan.

S
PLANS, North Tongass
Timber Management, Management Plans
Juneau Working Circle

Juneau, Alaska

A PLAN OF MANAGEMENT
FOR THE
JUNEAU WORKING CIRCLE

NORTH TONGASS NATIONAL FOREST

By

John E. Weisgerber, Forester, Division of
Timber Management, Region 10 and Roy A. Johnson,
Forester, North Tongass National Forest.

Region 10 - 1958

RECORD OF REVIEW AND APPROVAL
FOR
JUNEAU WORKING CIRCLE PLAN

Submitted By:

/s/ John E. Weisgerber Forester	10/7/58 Date	/s/ C. M. Armstrong Forest Supervisor	10/6/58 Date
/s/ Roy A. Johnson Forester	10/7/58 Date		

Reviewed By:

Division	Regional Office	Washington Office
Timber Management)J.F.S.		/s/ Ira J. Mason
Recreation and Lands)R.F.T.	/s/ M. B. Bruce	/s/ W. N. Parke
Watershed Management)J.E.S.		/s/ G. R. Salmond
Wildlife Management)J.E.S.		/s/ L. W. Swift
Engineering	/s/ G. E. Mitchell	/s/ C. T. Sullivan
Fire Control	/s/ Wayne Sword	/s/ Merle S. Lowden
Forest Management Research	/s/ R. F. Taylor	/s/ Carl E. Ostrom

Approved By: /s/ W. V. Benedict

/s/ P. D. Hanson Regional Forester	/s/ Edward P. Cliff Acting Chief L.S.G.
10/16/58 Date	12/5/58 Date

CAMP SHA-HEEN, popular Forest Service recreation center, on Lake Hasselborg, Admiralty Island.

Commercial forests, such as the timber in the background, on, and immediately surrounding areas of high recreational value will be managed on a multiple use basis. Timber harvesting in such areas will be for the purpose of maintaining or establishing a stand of timber satisfactory for the use for which the area is classified.

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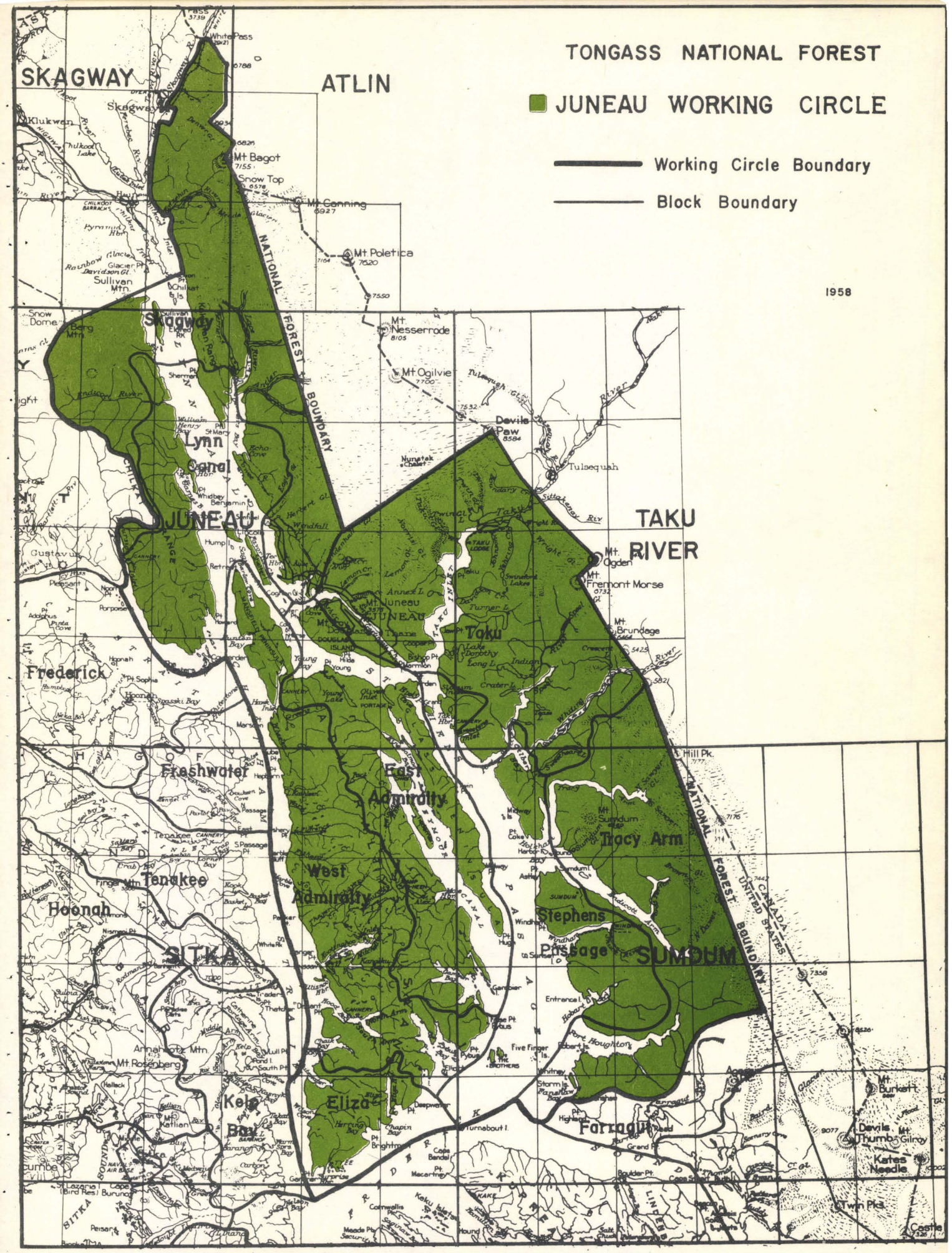

TONGASS NATIONAL FOREST
JUNEAU WORKING CIRCLE
Working Circle Boundary
Block Boundary
1958
SKAGWAY
ATLIN
TAKU RIVER
JUNEAU
Skagway
Lynn Canal
Frederick
Freshwater
Tenakee
Hoonah
SITKA
West Admiralty
East Admiralty
Kelp Bay
Eliza
Farragut
Stephens Passage
SUMDUM
Tracy Arm
Taku
Devils Paw
Mt. Ogilvie
Mt. Nesserrode
Mt. Poletica
Mt. Canning
Mt. Bagot
Mt. Ogden
Mt. Fremont Morse
Mt. Brundage
Mt. Burkett
Devils Thumb
Mt. Gilroy
Kates Needle
Twin Pks.
Hill Pk.
NATIONAL FOREST BOUNDARY
CANADA - UNITED STATES BOUNDARY

Unless otherwise noted all volume data in this plan are stated in terms of thousands of board feet Scribner Scale and all area data in acres.

SUMMARY OF PLAN
(1955 Inventory)

1. Area (Acres)

a. Total land area all classes and ownerships			3,832,500
Less:			
(1) Nonforest land	2,180,000		
(2) Noncommercial forest land	832,000		
(3) Commercial forest land:			
Alienated ownership	18,000		
Nat. Forest restricted areas	39,900	3/	
Nat. Forest reserved areas	5,500		
Nat. Forest inaccessible area	224,190		3,299,590
b. Net regulated Nat. Forest accessible commercial forest land			532,910

2. Volumes Commercial Forest Land (MBF) 1/

a. Total volume commercial forest land			23,348,000
Less:			
(1) Alienated ownerships	516,000		
(2) Nat. Forest restricted areas	1,136,500	3/	
(3) Nat. Forest reserved areas	165,000		
(4) Nat. Forest inaccessible area	6,266,700		
(5) Nat. Forest unregulated species	290,000	2/	8,374,000
b. Net regulated Nat. Forest accessible volume			14,973,800

1/ Excludes 75 MMBF in pole timber and 53 MMBF in nonstocked stand-size classes.

2/ Estimated that of the total inventory of 302 MMBF in cedar, lodgepole pine, subalpine fir, cottonwood and red alder, 12 MMBF is on alienated ownerships. Of the total of 290 MMBF on national forest land 200 MMBF is estimated to be on accessible and 90 MMBF on inaccessible commercial forest land.

3/ In the absence of detailed data from land use plans it is estimated that 5 percent of commercial forest land area and volume will be subject to limited and partial cutting which will not permit even-aged management by clearcut methods of harvesting. Of this, 90 percent is estimated to be within the area presently classed as accessible commercial forest land. Such partial cutting as permitted or required in areas classified as restricted will be unregulated.

	Accessible Commercial Forest Land	Inaccessible Commercial Forest Land 1/	Total Commercial Forest Land
3. Allowable Cut - Annual cut based on regulated commercial forest land area and volume (MBF)	179,500	66,500	246,000
4. Sustained Yield Capacity - Annual productive capacity of desired forest based on regulated commercial forest land area and volume (MBF)	280,117	117,842	397,959

1/ Presently treated as unregulated area and volume. Developments in economics and logging methods will eventually make some or all of this area and volume accessible. Computed and shown here as a means of indicating a maximum potential cut for all commercial forest land.

5. Revision of Plan

The action plans will be revised annually by February 15 for the subsequent fiscal year. The management plan will be reviewed and completely revised at 10 year intervals beginning with fiscal year 1960 (July 1, 1959). Therefore, the first revision date will be July 1, 1969. Other revisions of the plan may be made in accordance with the policy stated on page 4 of the Forest Plan.

6. Action Plans

Current five year and one year timber sale, access road and access road right-of-way action plans will be inserted following this page for ready reference in connection with complete working circle planning.

INTRODUCTION

1. Summary of results under previous plans.

Due to the small annual cut demands, formal management planning has not been warranted in the past. Until now no working circles had been designated for the Forest. At no time has the annual cut on the entire Forest exceeded 15 percent of the annual cut limitation fixed by the Secretary on June 1, 1939. Annual cut in terms of percentage of a proportional Forest allowable cut has been even less on the Juneau Working Circle. Past custodial management of the timber resources in this area has been carried on under the guidance of policy statements and manual supplements having general application to the entire Tongass National Forest.

Until 1953 economics and markets made it necessary to selectively cut easily accessible stands containing high grade spruce timber. This, in many cases, left substantial and even well-stocked residual stands of spruce and hemlock on many of the areas logged. Since 1953, when a pulp market became available for utilizing poorer log grades, the cutting policy on sales has been to clearcut all merchantable timber on the sale area leaving the cut-overs in a condition suitable for re-establishment of maximum timber production. For the period 1952 - 1957 the total cut on the working circle has been 54,806,190 board feet or an average annual cut of about 9 million board feet.

The Ketchikan Pulp Company Mill has had little influence on increasing the cut on this working circle because of the long tow and the fact that a major portion of the better timber-operating areas are within Georgia Pacific Alaska Company's Juneau unit primary logging area. For the same reasons it is doubtful if the Alaska Lumber & Pulp Co. Sitka Mill, now under construction, will cause a significant increase in annual cut on this working circle when it is completed and in the market for logs. Any large increase of the present cut will depend primarily on the progress made in bringing the Juneau unit pulp sale into production.

2. Administration of Working Circle

Within the working circle are parts of all three of the ranger districts comprising the North Tongass Forest. Each ranger is responsible for the multiple use administration of his portion of the working circle. The working circle allowable cut will be allocated annually or periodically to ranger districts by the Forest Supervisor.

The west side of Admiralty Island from the divide between the Ward Creek and Lake Florence drainages south to Pt. Gardiner is administered by the Sitka District Ranger. A minor part of the Juneau Working Circle in the vicinity of Cape Fanshaw is administered by the Petersburg Ranger. The major and most active portion of the working circle is under the stewardship of the Chatham District. Practical and efficient multiple use management of the working circle and administration of the Georgia Pacific Alaska Company primary logging area may later require revisions of administrative or even

the working circle boundaries. In the meantime it is not expected that any serious administrative problems will develop during the first ten-year period of this plan since the pulp sale operations will be confined to the initial operating area of the sale which is wholly within the Chatham Ranger District. Maps on appendix page JA-2 of this plan and page 1 of the forest plan show the relationship of the working circle, ranger district, and pulp sale primary logging area boundaries.

Cutting budget allocations for planning sales programs to independent loggers and manufacturers outside of the pulp sale primary logging area and on areas therein where sales may be made to others will necessarily be limited to the difference between the Company's cut and the working circle's allowable cut. For the first 10-year operating period the pulp sale purchaser is required to make an average annual cut of at least 55,000 MBF but not more than 195,000 MBF.

When pulp company operations begin, independent sales will be planned to produce a budgeted cut equivalent to the allowable annual cut less the Company's planned average annual periodic cut (from company's current periodic operating plans).

3. Description of Working Circle

The working circle includes the mainland from Cape Fanshaw north and west to Excursion Inlet and the whole of Admiralty Island.

The working circle boundary to the east and north from Cape Fanshaw around to Excursion Inlet on the mainland coincides with the forest boundary. It is bordered on the south by the Petersburg Working Circle, on the west by the Sitka Working Circle and on the northwest, north and east by the Glacier Bay National Monument, Public Domain and Canadian lands respectively.

The working circle is divided into eight blocks as shown on the map on page J-1, designated as follows:

1. Taku
2. East Admiralty
3. West Admiralty
4. Tracy Arm
5. Skagway
6. Stephans Passage
7. Eliza
8. Lynn Canal

The Juneau pulp unit sale was provisionally awarded to Georgia Pacific Alaska Co. on August 18, 1955. On July 1, 1958 the Company was granted a 3-year extension of requirements for final award of the contract and related deadlined dates in connection with plant construction.

By the terms of the contract the exterior boundaries of the sale area include (in addition to a portion of the Sitka Working Circle) all of the Juneau Working Circle except for the Port Houghton drainage in the southernmost corner of the Tracy Arm block. The primary logging area of the sale area includes all of the East and West Admiralty, the Stephens Passage and the Lynn Canal blocks as shown on the map on page JA-2.

Company logging operations will be confined to the primary logging area except as provided for in Section 1a, page 3 of the contract. Unless otherwise noted, any reference made to the sale area in this plan is in respect to the primary logging area.

Detailed area and volume data may be obtained from the Juneau Unit Forest Inventory Statistical Report, Forest Survey Report No. 1, March 1957. Area and volume data for National Forest commercial forest land by blocks and stand-size classes for accessible and inaccessible areas will be found on pages JA-3 and JA-4 of the appendix section of this plan.

The map on page JA-2 of the appendix shows the boundaries of the Georgia Pacific Alaska Co. primary logging area within which are shown the areas available for sales to independent purchasers and the areas designated for special treatment.

The estimated acreage and volumes of commercial forest land included in the areas available for sales to others under section 1b, page 4, of the Georgia Pacific Alaska Co. contract are shown below.

Location	Accessible Acres	Accessible Volume MBF	Inaccessible Acres	Inaccessible Volume MBF	Total Commercial Forest Land 1/ Acres	Total Commercial Forest Land 1/ Volume MBF
Lynn Canal	3,400	96,000	1,200	35,000	4,600	131,000
Mansfield Peninsula	8,400	237,000	3,000	89,000	11,400	326,000
Glass Peninsula	13,900	392,000	4,200	124,000	18,100	516,000
Gilbert Bay	4,800	135,000	2,200	65,000	7,000	200,000
Total	30,500	860,000	10,600	313,000	41,100	1,173,000

1/ Acreage determined from dot count of generalized type maps and volume from average volume per acre for CFL seggregated by accessible and inaccessible areas by average percentage by blocks.

Relationship of areas and volumes of the Georgia Pacific Alaska Co. primary logging area to the remainder of the working circle is shown in the following table:

AREA AND VOLUMES (MBF) 1/
NATIONAL FOREST COMMERCIAL FOREST LAND

	Accessible Acres	Accessible Volume MBF	Inaccessible Acres	Inaccessible Volume MBF	Total Acres	Total Volume MBF
Geo.Pac.Alaska Co. Primary Logging Area	357,660	10,521,950	139,790	4,117,600	497,450	14,639,550
Bal.of Working Circle	175,250	4,451,850	84,400	2,149,100	259,650	6,600,950
Total Working Circle	532,910	14,973,800	224,190	6,266,700	757,100	21,240,500

1/ Net available for even-age management by clearcut harvesting methods where primary objective is timber production.

The area in the Georgia Pacific Alaska Co. primary logging area has a disproportionally high percentage of commercial forest land area and volume when compared to the rest of the working circle. While the primary logging area includes only 35 percent of the total land area it will be seen from the above table that it contains 66 percent of the working circle's commercial forest land. Likewise, it can be seen that of the total commercial forest land on this pulp sale primary logging area 72 percent is classed as accessible compared to only 67 percent for the balance of the working circle.

4. Forest Description

The forest types and silvical characteristics are described in the forest plan on pages 10 and 11. It is to be noted here that western red cedar (Thuja plicata) does not occur on this working circle. Alaska-cedar (Chamaecyparis nootkatensis) occurs in commercial quantities and sizes over most of the working circle, principally on the mainland and the southern portion of Admiralty Island.

There are notable areas of hardwood type, mainly cottonwood, willow and alder, in the Taku and Skagway blocks. The Taku block has 1,700 acres and the Skagway block has 3,400 acres of commercial forest land classified as a hardwood type. This hardwood type is mainly a temporary and transitional one which typically comprises the first timber type to appear after glacial recessions and on alluvium deposits along river valleys. Such types will gradually and naturally be converted to spruce and much later to a spruce-hemlock type. The glacial moraines and alluvium deposited areas of the Taku, Lynn Canal and Skagway blocks also have significant acreages of immature stands of spruce type.

The mainland which includes about 75 percent of the total land area of the working circle contains only 55 percent of the commercial forest land. Likewise percentage of inaccessible CFL is significantly higher on the mainland, being 34 percent inaccessible against 24 percent for the island area.

Detailed data on timber types, species composition, average diameters, stand volume classes, etc. may be obtained from the inventory statistics of Forest Survey Report No. 1, March 1957.

Working Circle statistics indicate some significant variances with general statements made in the forest description section on page 10 of the Forest Plan. Eight percent of the commercial forest land is occupied by even-aged second growth stands, 6 percent by young-growth sawtimber and 2 percent by poletimber. In this working circle the origin of most of these second growth stands are stated to be the result of destructive winds, particularly in the northern portion. Many of the stands over a wide area are of approximately the same age class. It then can be assumed that particularly destructive winds infrequently occur which cause catastrophic windthrown losses. This observation points up the necessity of being alert to the detection of widespread scattered losses in order to plan for maximum salvage.

An additional 3 percent of the commercial forest land is occupied by seedlings and saplings (1 percent) and nonstocked and other (2 percent). Inventory states that exposed ground resulting from receding glaciers accounts for a major portion of these stand-age size classes which are in various stages of stocking. Establishment of tree growth and increased stocking on them is essentially a natural long term development -- one not likely to be adaptable to successful stocking by artificial means. The significance of this observation is that the potential job of planting or seeding the presently nonstocked areas therefore is reduced by the amount found to be under stocked for this reason.

Some significant highlights of the working circle's inventory statistics, not readily available elsewhere in this plan, are:

1. Species - Total board foot volume is represented by 66 percent hemlock, 32 percent Sitka spruce, 1 percent Alaska-cedar and 1 percent lodgepole pine, subalpine fir, cottonwood and red alder.

2. Forest Types - Seventy-five percent of the commercial forest land area is occupied by the hemlock type, 23 percent by about equal amounts of Sitka spruce and hemlock-Sitka spruce types and 2 percent by about equal amounts of cedar and hardwood types.

3. Stand-size Classes - Sawtimber stands occupy 95 percent of the commercial forest land area with 94 percent of it in old-growth, uneven-aged stands. The old-growth sawtimber stands represent about 94 percent of the total board foot volume and average about 30 MBF per acre.

4. Diameter Classes - Thirty-nine percent of the total softwood volume is in the 21 to 30 inch diameter class group, 20 percent in the 31 to 40 inch group and 12 percent in trees 41 inches and larger d.b.h.

5. Stand Volumes - Eighty percent of the accessible commercial forest land area is occupied by stands with volumes 16 MBF and more per acre, represent 93 percent of the total board foot volume of accessible commercial forest land and average about 34.5 MBF per acre.

ACTION PLAN

1. Management Objectives

In order to develop this working circle to meet the broad general objectives stated on pages 17, 18 and 19 of the forest plan emphasis will be placed on the following goals during this plan period:

a. Attain full allowable cut as soon as practicable after establishment of a pulp plant in connection with the Georgia Pacific Alaska Co. sale. During the interim period, as a means of promoting stability of cut by independent purchasers, restrict the establishment of independent logging operations by limiting timber sale offerings to produce an annual cut of 20 to 30 MMBF.

b. Leave cutover areas in best possible condition for establishment of a fully stocked stand of reproduction immediately following cutting.

c. Secure prompt regeneration of desired species composition on harvest cut areas by either natural or artificial means with emphasis on obtaining natural regeneration.

d. Locate and record old understocked cutovers in need of treatment to attain full production. Project necessary treatment as P & M funds are available.

e. Collect KV deposits on all sales in accordance with Regional policies. Utilize deposits to secure prompt reproduction surveys and execute treatment found to be necessary in an orderly and systematic manner.

f. Classify and record areas judged to be suitable for a commercial intermediate cut (thinnings, etc.) in Timber Management Historical Atlas based on observations made in sales preparation and pulp sale cutting unit layouts.

g. Develop and maintain an orderly sales preparation and advertisement program based on the needs of established independent loggers with due consideration given to economical administration and current market limitations.

h. Promptly salvage losses sustained from fire, insect or windthrow where accessibility and economic factors permit.

i. Develop and maintain improved protection of timber stands cutover areas and site from fire, insects, erosion and windthrow.

j. Plan and develop a correlated long range timber access road program.

k. Emphasize multiple use concept of management in harvesting timber contiguous to salmon streams and areas whose primary use is other than timber production.

2. Coordination with other uses

a. Reserved Areas

Refer to page 18 and 19 of the forest plan. Pack Creek and Limestone Inlet Natural Areas and Tracy Arm-Fords Terror Scenic Area (proposed) are listed and described there as Reserved Areas where no cutting is permitted. A description of additional Reserved Areas on the working circle follows:

(1) Research permanent plots

Plot No. 302, Whitewater Bay
Plot No. 303, Windfall Harbor
Plot No. 305, Pt. Anmer
Plot No. 306, Eagle River

The forest management research permanent plots include less than 10 acres. However, protective or buffer strips around these plots will be required on which cutting will also be prohibited. The size of the surrounding protective zone will depend on the objective of establishment and the required protection from clear cutting influences and potential windthrow for each individual plot. The gross area to be excluded from cutting plans in each case will be determined by a joint ground examination by administration and research representatives. The total area to be excluded will be marked by exterior and/or interior sale area cutting boundary lines and specifically shown on the sale area map. Such buffer areas will not be yarded across nor used for access. Adjacent timber designated for cutting will be cut so as to fall away from the boundaries of these buffer zones.

Sale contracts will include any other requirements necessary to fully protect these permanent research plots. It will be the responsibility of the Alaska Forest Research Center to furnish N.F. Administration with all pertinent information regarding establishment of additional plots on the working circle. Reduction of regulated area and volume due to these plots will be small and is considered to have been taken care of by the 5 percent reduction of commercial forest land and volumes applied for Restricted Areas.

(2) Young Bay Experimental Forest (Proposed)

The Young Bay Experimental Forest is being established for the purpose of replicating the Maybeso Experimental Forest's (South Tongass) studies for the purpose of determining the effects of logging on salmon spawning streams. Silvicultural research may also be carried on in reproduction and young growth stands. It is composed of two small drainages. One of these will be clearcut and the other left uncut as a check for about 20 years. Cutting will be unregulated. Therefore, the following areas and volumes for this area, not previously deducted in the inventory nor listed in the Forest Plan, have been deducted from regulated commercial forest land area and volume.

	Area	Volume (MBF)
Accessible Commercial Forest Land	1,900	54,700
Inaccessible Commercial Forest Land	600	17,300
Total	2,500	72,000

A breakdown of area and volume estimates by stand-size classes and forest types is shown in Research's R-AL-Experimental Forest, Young Bay (U-CLASSIFICATION, Experimental Area) memorandum dated 6/23/58.

Area and volume data for additional areas subsequently withdrawn from regulated timber production as reserved areas will be promptly listed in the Timber Management Historical Atlas on form S-429-R10 as they are established.

b. Restricted Areas

A multiplicity of land use is evident mainly in the Juneau-Douglas, Taku River, Admiralty Island and Lynn Canal areas. Within these broad areas classifications of present and potential land uses other than timber production will include a substantial aggregate acreage of commercial forest land.

Individual area classifications will be subject to various degrees of cutting restrictions. Cutting on or immediately adjacent to them will be solely for the purpose of establishing and maintaining a stand of timber satisfactory for the use for which the area was classified.

These areas of commercial forest land, since cutting restrictions do not permit even-aged management primarily for timber production, will be unregulated. Since land use and transportation planning is presently only in a preliminary stage, it is not possible at this time to tabulate and determine, with any detail, the total commercial forest land not available for allowable cut computations. An analysis of existing and known potential areas of this nature indicates that the aggregate area primarily devoted to land uses other than timber production will represent about 5 percent of the commercial forest land. It is further estimated that 90 percent of this area is presently classed as accessible commercial forest land.

Definite and detailed data and cutting policies for all such areas will be possible in the first revision of this plan when detailed land use and transportation plans will have been developed. For the purpose of this plan period the timber resources of all of them are considered to have been removed from the calculation of allowable cut by deducting the 5 percent of commercial forest land area and volume stated above.

(1) Mendenhall Recreation Area includes approximately 1,500 acres of accessible commercial forest land. Virtually all of it is, or will be, visible from points accessible to recreation users. Recreation is the primary use of the area though timber cutting is not entirely prohibited. Land use plans include provisions for intensive recreational developments over most of the area. For these reasons it is anticipated that cutting will be rarely done. Sales may be made only as a means of eliminating danger trees, fire or insect killed patches and other treatments necessary to maintain maximum aesthetic recreational values for the area. Any proposed timber sales in this area, regardless of size, must be approved by the Forest Supervisor.

The entire stand of timber in this area is classed as restricted. Therefore, any limited cutting performed within it will be charged as an unregulated cut.

(2) Admiralty Lakes Area includes a large acreage in the center of Admiralty Island. It is designated as a special treatment area in the Georgia Pacific Alaska Co. sale contract. Within it primary use is three-fold, namely timber production, recreation and wildlife. It includes the Thayer Mt. Bear Refuge as set up by a Brown Bear Management Plan published in 1934 (U.S.D.A. Misc. Pub. No. 195). Gross area includes approximately 21,300 acres of commercial forest land of which about 14,900 acres is presently classed as accessible commercial forest timber.

It is recognized that the three dominant uses in this large area will be intermingled. Until a land use plan is made and the brown bear management plan is reviewed in the light of current knowledge, it is not possible to definitely tabulate specific area classifications and their treatments within it for each use. Full development of the recreation resource here will depend largely on access roads developed from planned timber harvesting. However, a detailed area classification is not critical for timber management purposes now since the entire area, though within the pulp sale, is outside of Georgia Pacific Alaska Company's initial 10-year operating area.

Land use plans and the revised Admiralty Brown Bear Management Plan when prepared and approved will be used in the development of well defined area classifications and cutting policies. They will be specifically outlined herein when the first revision of this plan is made.

(3) Pack Creek Bear Refuge includes the entire drainage of Pack Creek. The lower portion of the refuge overlaps the Pack Creek natural area, on which no cutting is permitted. Nearly all the area classified as commercial forest land in this drainage is included in the natural area for which deductions were made as a reserved area. Since no access through the natural area is possible, the small amount of timber in this drainage which is outside of the natural area cannot be cut and is likewise excluded from area and volumes used in the calculation of allowable cut.

(4) Shelter, Coughlan, Portland, Benjamin and Lincoln Islands are small islands supporting commercial stands of timber. They lie off Auke Bay and border the steamer route from Juneau to Skagway. The east side of Shelter Island is designated as being subject to the narrow steamer lane policies. These islands are in the center of the famous Juneau sport fishing grounds. Intensive developments for other recreational uses are also planned.

Shelter Island, by far the largest of the group, includes about 1,800 acres of commercial forest land. The multiplicity and intensity of recreational uses in the area dictate that harvest cuts would rarely, if ever, be made on these islands. The entire timber resources of this group of islands are, therefore, considered to have been removed from the calculation of the allowable cut. Cut volumes will be unregulated and not charged to the allowable cut.

The Forest Supervisor may approve the cutting by timber sale of any fire or insect losses and other cutting treatment necessary on these islands purely as a means of maintaining or developing the recreational values. The Regional Forester's approval will be required if it is considered necessary to include adjacent undamaged timber to economically permit the removal of timber damaged by fire or insects by means of sale procedure.

(5) Gastineau Channel narrow steamer lane includes National Forest lands on both shores, extending south from the southern boundary of the Juneau Elimination to Point Salisbury on the mainland and Marmion Island on the Douglas side. There are approximately 1,000 acres of commercial forest land within the area. All of this is affected by the current narrow steamer lane policy cutting restrictions.

Cutting of timber in this area may be permitted only in accordance with the current Regional Forester's policies pertaining to "narrow steamer lanes". All timber sales in this area will be approved by the Forest Supervisor.

The present policy for this type of land classification will not permit even-aged management of the timber stands. Therefore, the entire area is considered to have been removed from this calculation of allowable cut. Salvage of fire or insect killed timber will be subject to the same restrictions stated for item (4), above, and will not be charged to the current allowable cut.

(6) Douglas Island includes a portion of the initial operating area of the Georgia Pacific Alaska Company sale. Part of it is designated as a "special treatment area" in the sale contract. Recreation use plans which have been prepared for the Douglas subunit include the planned development of this "special treatment" area. There is an aggregate gross area of about 3,800 acres of land specifically planned for recreational developments along the west shore of Douglas Island from Fish Creek to Marmion Island. The portion of this acreage which is commercial forest land has not been determined. Planned developments generally are included in a 10 to 40 chain wide strip paralleling the shoreline. It is doubtful if more than 1,000 acres of commercial forest land are involved.

Any timber cutting within or immediately adjacent to the area classifications set forth in the Douglas subunit recreation plans, whether by timber sale or other means, will be for the sole purpose of maintaining or developing the timber stands to a suitable condition for the classified use. Such areas are unregulated and volumes cut therefrom will not be charged to the allowable cut. Logging plans for the entire area prepared jointly with the pulp company will be reviewed and approved by the Forest Supervisor. They will include the cutting limits and special provisions necessary to maintain timber stands in and surrounding planned developments in a desirable condition.

(7) Miscellaneous multiple use areas include the small scattered existing or planned developments such as campgrounds, picnic areas, administrative and public service sites, road, trail, and water front zones, isolated shelters and cabins, special uses and other areas not otherwise accounted for in items (1) through (6) above. It is not planned that harvest cuts will be made in or immediately adjacent to existing or proposed uses. Cutting may be permitted on them only as a means of maintaining or improving the timber stand to a condition satisfactory for the intended use. Desired cutting when done by means of timber sale on or adjacent to any of these classified areas will require the Forest Supervisor's approval.

The aggregate unregulated area and volumes of these small use classifications are considered to have been deducted from the commercial forest land area and volume used in computing the allowable cut by means of the 5 percent deduction previously discussed. Volumes removed from them will not be charged to the allowable cut.

3. Regeneration and Sale Area Betterment

The fundamental policy of timber management will be to apply such treatment as is necessary to secure satisfactory restocking of areas cutover or otherwise depleted with a desirable species composition as quickly as possible. During this plan period, major emphasis will be placed on locating, classifying and recording the condition of all cutover areas clearcut subsequent to 1950. Classifying and projecting the needed treatment will be systematically accomplished in accordance with current Regional policies in respect to reproduction surveys, seeding and records.

Generally reliance will be placed upon natural regeneration. This will necessitate a careful analysis of the areas being prepared for cutting. Due consideration must be given to maintaining adequate natural seed sources in the form of seed strips or blocks and deferred cutting areas until cutovers are satisfactorily stocked.

Until research and experience indicates otherwise a seed source will be made available within a maximum distance of 20 chains from clearcut areas. Seed blocks or strips and deferred settings will be so located as to minimize windthrow. Advantage will be taken of narrow beach strips approximately 50 feet wide for this purpose since, in addition to providing a seed source, they

may provide (1) a windbreak on exposed shores, (2) wildlife cover and shelter and (3) maintenance aesthetic values. Quite often the trees in a narror band along the beach are so deformed, limby and defective that they are hardly merchantable. On the other hand because of their exposure they are usually quite wind firm and are heavy seed producers.

Valley floors and benches where noncommercial species and brush are expected to become a barrier to natural regeneration immediately following clearcutting will be programed for immediate seeding. Cutover reproduction surveys and artificial seeding of areas found to be unsatisfactorily stocked will be programed in accordance with current time limitations and methods prescribed by R-10 Manual supplements and the timber survey handbook.

KV deposits will be collected for each sale in accordance with current R-10 Manual supplements. P&M funds for artificial regeneration and sale area betterment are not now available. Nonstocked areas for which no KV funds are available, when located, will be classified, recorded and P&M funds requested to accomplish the required work. Strict compliance with the Region's current KV policy will, to all practical purposes, eliminate any need of P&M funds for future cutovers.

With the exception of the Georgia Pacific Alaska Company primary logging area, cutting or poisoning of live culls will be unnecessary on most sales. It is preferred that this sale area betterment measure be accomplished by the sales policy of designating the trees required to be cut. During this plan period, poisoning or falling of noncommercial species such as alder and cottonwood for the purpose of reducing undesirable seeding of cutover areas will not be programed unless authorized by the Forest Supervisor on an experimental basis. No pruning as a sale area betterment project is contemplated during this plan period.

Inventory statistics show an estimated 20,000 acres of nonstocked and other commercial forest land. However, 95 percent of this estimated area is located on the Taku, Tracy Arm, Skagway and Lynn Canal blocks. A major portion of these areas are mainland glacial moraines and silt deposited uplands which have not yet become satisfactorily stocked with an original tree growth. Therefore it is presumed that only minor and scattered nonstocked areas subject to successful artificial regeneration are to be found. It is not contemplated that a project effort will be made to locate and survey the small amount, apparently existing, which can be successfully treated artificially. When understocked old cuttings or windthrown areas needing treatment are found in the course of routine travel they will be recorded as provided for in the Timber Management Historical Record. Treatment of these understocked areas can be programed as P&M funds may be made available for this purpose.

4. Timber Stand Improvement

Nearly 90 percent of the commercial forest land is presently in old growth sawtimber stands not subject to any practical stand improvement measures. Stand improvement treatment of second growth stands is not contemplated during this plan period because (1) funds are not expected to be available for noncommercial treatments, (2) markets and economic climate will not presently permit commercial sale treatment and (3) the location and extent of present second growth stands subject to commercial partial cutting under present logging conditions are not known.

From a long range standpoint one intermediate cut is planned as a thinning, sanitation and risk tree cut by means of commercial sales. Depending on economics and logging methods it is expected that stands 60 to 80 years old having topography and accessibility favorable to partial cutting will be subjected to this treatment. In order to prepare for planning and implementing this program as sufficient stands become available and economic factors permit this type of cutting later in the rotation it will be necessary to locate and classify areas suitable for this planned cut. The sale or cutting unit preparation stage of harvest cuts will provide the information necessary to assess the potentials of each area harvested. The same data for present immature stands will be recorded as information is obtained from reconnaissance surveys and day to day work. A record of areas having the necessary site, topographic and accessibility qualifications will be recorded by location and area as prescribed for the Timber Management Historical Atlas.

5. Protection

Protection of the forest resources from damage and losses due to fire, insects, erosion and windthrow will be an important phase of timber management. Expanding harvesting of the timber and recreation use will result in a proportional increase of damage and loss potentials. Administrators of the working circle must be alert to these hazards and consciously work towards practicable solutions for reducing the risk of potential losses consistent with economics, regulations and the guidelines set forth under "Protection" on page 25 of the Forest Plan.

During this plan period particular emphasis will be placed on (1) including necessary contract requirements and (2) educating timber purchasers to cooperate and fully comply with the contract requirements to the extent necessary to reduce resource losses to practicable limits.

Potential blowdown along cutting boundaries and on deferred settings or seed blocks and strips will be carefully considered when designing and laying out cutting units. Field personnel will be alert to insect activity and promptly report information independently and as requested by the Alaska Forest Research Center entomologist.

6. Sales and Cutting Policies

It is expected that progress towards achieving an actual cut equal to allowable cut will be slow to develop during this plan period. Georgia Pacific Alaska Company's three year extension of requirements for execution of the sale contract granted 7/1/58 indicates that major cutting on the pulp sale probably cannot be expected much before 1963.

For a number of reasons it is not desirable to encourage the establishment of independent loggers on this working circle until a general market exists for all products in the Juneau area. Should there be an appreciable demand to increase the present rate of cutting due to a Sitka market we will try to hold such increase to a total cut of not more than 30,000 MBF. This represents approximately the balance of allowable cut available if the pulp company were cutting at a normal rate on its primary logging area.

Permission to make sales on Georgia Pacific Alaska Company's primary logging area will not be requested except for unusual situations pertaining mainly to location of permanent residency of the applicant. Sales may be made at any time in the areas within the pulp sale where sales to others may be made (listed on page J-6 of this plan) consistent with other policy and administrative considerations.

Generally, sales or pulp sale sub-contractors will be concentrated within certain bays, inlets or harbors for the purpose of reducing costs of administration. Certain exceptions may be permitted in order to prevent undue hardships on sale applicants having a permanent residence in isolated areas. The sales action plan will reflect this policy by providing planning ahead for the necessary presale work for sale advertisements and pulp sale cutting unit layouts. Small piling and specialty product sales will continue to be made as needed in locations which best suit economic, silvicultural and accessibility requirements.

It will be the policy to leave cutover areas in the best possible condition for the new stand immediately after the harvest cut. Generally, the most practical means of accomplishing this goal on all sales except the pulp sale is by contract designation of the trees to be cut. With few exceptions sale contracts will be written to require that all trees of a selected d.b.h. and larger will be cut regardless of merchantability. Justified exceptions will require the approval of the Forest Supervisor.

Sale action plans will be of the intensity necessary to execute sale preparation needs sufficiently in advance to permit group advertising of a number of sales in early spring of each year adequate to provide purchaser needs for the year. Emphasis will generally be placed on providing sales of a size commensurate with established and regularly operating loggers' needs for a two or three year period. This will insure a minimum number of sales and will provide greater operating stability for purchasers. Unadvertised sales will not be made to regularly operating purchasers except: (1) As an interim measure to provide work for a regular purchaser who is out of timber due to reasons beyond his control such as (a) failure to secure a sale contract after entering a reasonable bid or bids on advertised offerings or (b) failure on the part of the Forest Service to make timely advertised offerings to meet anticipated needs and (2) to provide small amounts of specialty products having limited or seasonal markets which are not available on his operating area.

Sale action plans and advertisements will be discussed with interested purchasers as a group prior to scheduled advertisements in accordance with policy set forth in R-10 Manual supplements. For this plan period the objective will be to make all the necessary advertisements possible for each calendar year early in the spring. Every effort will be made to offer the sales necessary to meet the budgeted cut as closely as possible.

It is becoming increasingly difficult to offer purely cat yarding shows without (1) cutting the face off logical cutting units, (2) scattering sales and (3) permitting cat yarding on topography and soil structures where serious erosion and site damage is likely to result. For these reasons purchasers will be encouraged and eventually forced to adjust their logging methods to conform with the type of sales we are able to offer on the basis of sound management practices.

7. Regulation

a. Allowable Cut Calculations

All forest types of this working circle will be under even-aged management with clearcut harvesting employed for harvest (regeneration) cuts.

An adaptation of the Hanzlik method was selected for computing allowable cut. The basic method is outlined in detail in L.S. Gross' "Timber Management Plans on the National Forests 1950" as a means of calculating allowable cuts for forests where virgin stands predominate and even-aged management is to be applied. The Forest Plan indicates the desirability of liquidating the overmature climax stands in the shortest time possible consistent with maintaining an even flow of timber and the ultimate development of the desired second growth stands with normal age class distribution. In order to hasten the liquidation of the old growth stands expected yields from (1) commercial intermediate cuts and (2) harvest cuts of high site index stands short of rotation age were included as available volumes in the calculation of allowable cut. The utilization of these estimated volumes represents 13.7 years of the rotation's allowable annual cut and increases the current plan period's allowable annual cut by 22,370 MBF.

Data needed for the computation of the allowable cut on the above basis was developed as follows:

(1) Rotation - 110 years and Average Site Index - 110

Since the forest inventory was unable to give area data by site index classes, it was necessary to select an average site index for the working circle. Details of the derivation of an average site index and the selection of a rotation age are shown on pages JA-7 and JA-9 of the appendix to this plan. There is no reason to believe site index or rotation age will differ for accessible and inaccessible commercial forest land classifications.

(2) Volume of regulated accessible and potentially regulated inaccessible old growth sawtimber stands.

(a) Accessible commercial forest land - 14,136,900 MBF

(b) Inaccessible commercial forest land 5,887,800 MBF

See page JA-3 of the appendix to this plan. The forest plan states that allowable cut will be based on regulated area and volume presently classed as accessible. It also states that an allowable cut will be computed for inaccessible commercial forest land and volumes as well. The volume stated above for inaccessible area is termed regulated in the sense that if all the area became accessible this volume would represent the regulated volume used to determine the allowable cut of the area.

(3) Increment is developed for both commercial forest land classifications as shown on page JA-6 of the appendix to this plan. Increment, then, is 21,664 MBF for accessible and 9,790 MBF for inaccessible regulated young growth sawtimber and immature stands. No net growth is expected from stands classified as old growth sawtimber.

(4) Estimated yield from intermediate cuts is 808,500 MBF from accessible commercial forest land. See page JA-10 of the appendix of this plan for the method of developing this volume. Because of the general topography and location features it is felt that there are relatively few areas suitable by present logging methods for planning partial cuts on areas presently classed as inaccessible. Likewise, cutting in inaccessible areas undoubtedly will be somewhat delayed and will not occur during this plan period. Hence it is unlikely that second growth stands in suitable age classes for commercial thinnings will be developed in these areas during the first rotation. Therefore, this type of volume was not considered to be available for the calculation of the allowable cut on areas presently classified as inaccessible.

(5) Estimated yield from harvest cuts in stands less than rotation age is 1,652,500 MBF from accessible commercial forest land. See page JA-11 of the appendix to this plan for the basis on which this volume was derived. No volume of this type was considered for inaccessible areas for the same reasons given in (4) above.

Using the above data, substitutions are made in the modified Hanzlik formula as follows:

Accessible Commercial Forest Land

$$IAC = \frac{VM + Ic + Hi}{R} + I$$

where IAC = Indicated annual allowable cut (MBF).
VM = Volume old growth sawtimber (MBF).
R = Rotation (years).
I = Annual increment of present young growth sawtimber and immature stands (MBF).
Ic = Total estimated yield from intermediate cuts (MBF) during rotation.
Hi = Total estimated yield from harvest cuts of stands less than rotation age (MBF) during rotation.

then $IAC = \frac{14,136,900 + 808,500 + 1,652,500}{110} + 21,664$

$= \frac{16,597,900}{110} + 21,664$

$= 150,890 + 21,664$

$= 172,554$ MBF

Inaccessible Commercial Forest Land

$$IAC = \frac{VM}{R} \not I$$

(Same definitions of symbols as shown under accessible commercial forest land.)

$$\text{then } IAC = \frac{5,887,800}{110} \not 9,790$$

$$= 53,525 \not 9,790$$

$$= 63,315 \text{ MBF}$$

An initial area-volume check on each of the above indicated annual allowable cuts results in 114.43 years of cut for accessible and 115.46 years of cut for inaccessible commercial forest lands. An adjusted area-volume check (see page JA-5 in the appendix of this plan) for a 110 year rotation then results in the following annual allowable cuts:

Accessible commercial forest land - 179,500 MBF

Inaccessible commercial forest land - 66,500 MBF

Total all commercial forest land - 246,000 MBF

b. Sustained Yield Capacity

Refer to page 32 of the Forest Plan whereby a calculation of the timber growing capacity of the commercial forest lands is required. Also see page A-9 of the appendix to the Forest Plan for definition of sustained yield capacity. The calculation is based on a 110 year rotation with an average site index of 110. Using yield table No. 13, page A-6 of the appendix to the Forest Plan, it is determined that the average acre at rotation age can be expected to produce a net volume of 57,820 board feet (normal yield volume of 74,129 board feet discounted 22 percent for understocking and defect and breakage).

From the area summary on page J-2 of this plan (also pages JA-3 and JA-4 of the appendix to this plan) it is found that there are 532,910 acres of accessible and 224,190 acres of inaccessible regulated commercial forest land. This is a total of 757,100 acres of potential regulated commercial forest land subject to even-aged management. Then it can be expected that, having achieved a normal distribution of age classes in second growth stands, sustained yield capacity will be the number of acres of regulated commercial forest land times the yield per acre (MBF) divided by the rotation age as follows:

$$\frac{757,100 \times 57.82}{110} = \frac{43,775,522}{110}$$

$$= 397,959 \text{ (MBF)}$$

Segregated by accessible and inaccessible classifications sustained yield capacities are:

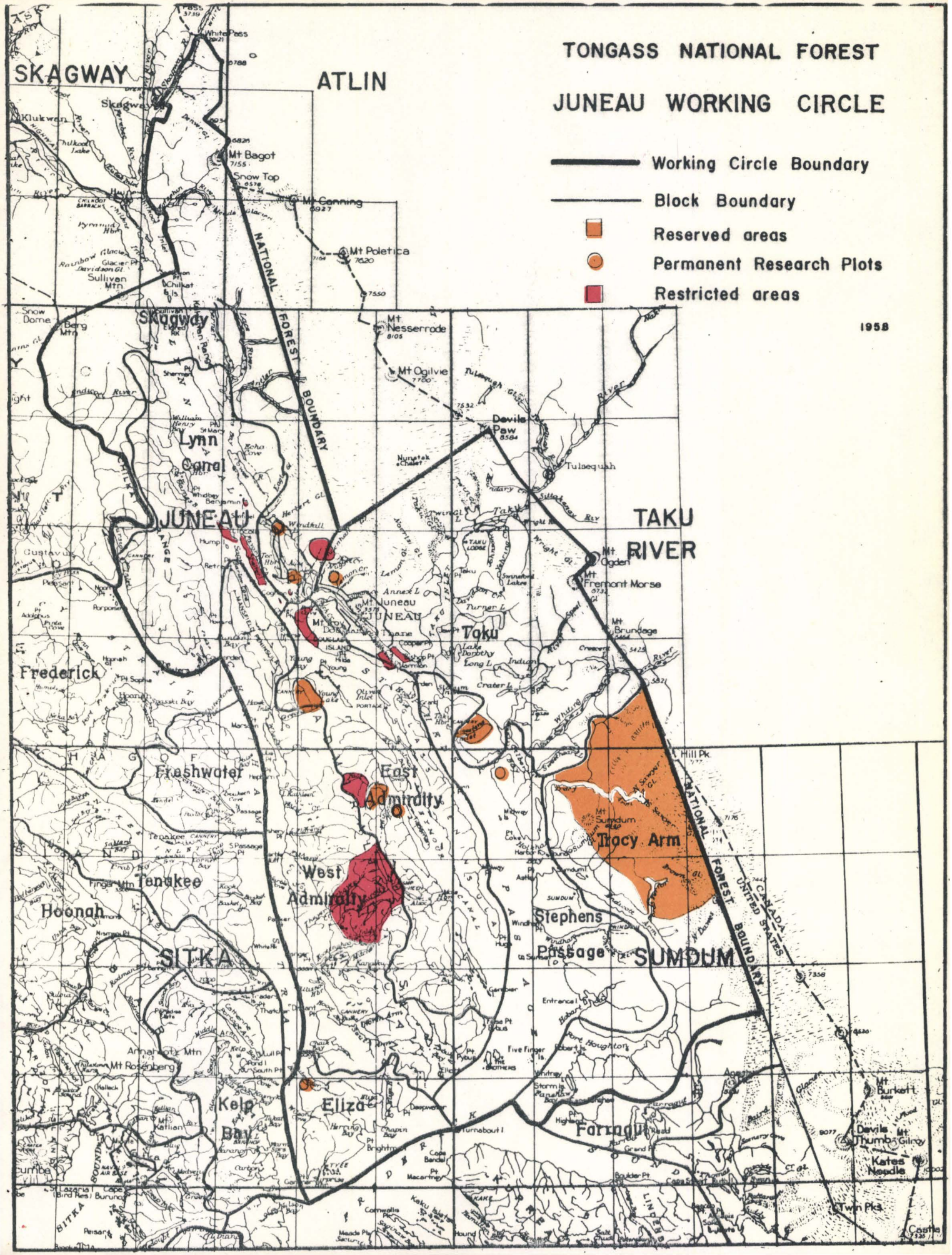
Accessible commercial forest land - 280,117 MBF

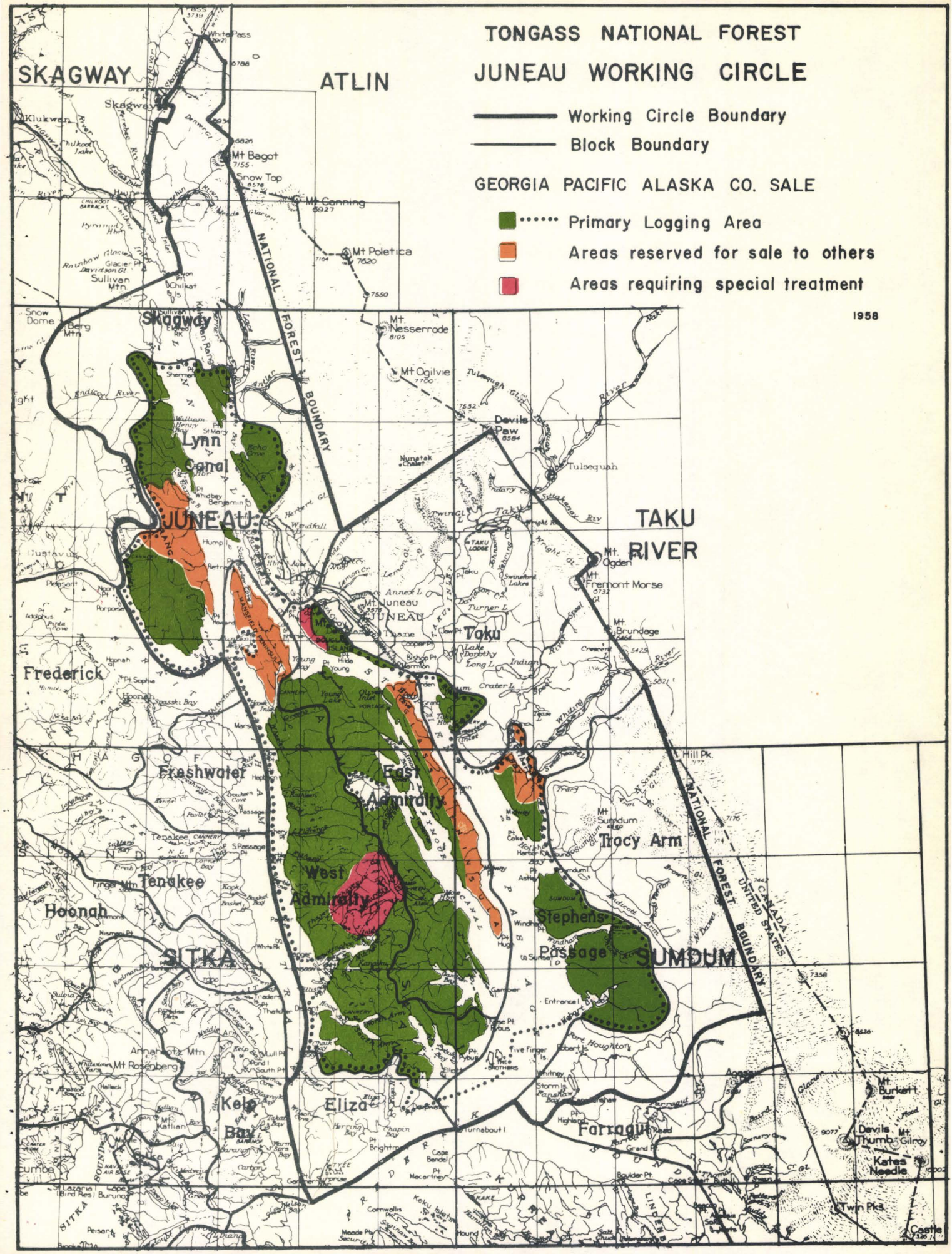
Inaccessible commercial forest land - 117,842 MBF

Under the system employed for calculating this annual allowable cut a normal distribution of age classes cannot be totally achieved during the first rotation. Theoretically the cutting of some of the better sites twice in the first rotation will also result in a reduction of the allowable cut over the first 30 years of the second rotation. However, the advantages gained in an accelerated cut of the overmature climax stands and the maintenance of a more even flow of timber during the adjustment period outweigh these disadvantages.

Appendix

A few of the more than 300 boats fishing in an annual Juneau Golden North Salmon Derby. Shelter Island in the background supports commercial forests which would ordinarily be managed for the purpose of timber production. This sports salmon fishing area, popular from April to September, includes other timbered islands and mainland bordering Favorite and Saginaw Channels south from Lincoln Island to Middle Point on Douglas Island. Commercial timber stands in and immediately surrounding such important recreation areas will be managed primarily for the purpose of establishing and maintaining satisfactory aesthetic values.


TONGASS NATIONAL FOREST
JUNEAU WORKING CIRCLE
Working Circle Boundary
Block Boundary
Reserved areas
Permanent Research Plots
Restricted areas
1958
SKAGWAY
ATLIN
JUNEAU
TAKU RIVER
SITKA
SUMDUM
Lynn Canal
Frederick
Freshwater
East Admiralty
West Admiralty
Tracy Arm
Stephens Passage
Taku
Tenakee
Hoonah
Kelp Bay
Eliza
Farragut
NATIONAL FOREST BOUNDARY
CANADA
UNITED STATES
Mt Bagot
Snow Top
Mt Canning
Mt Poletica
Mt Nesserrode
Mt Ogilvie
Devils Paw
Tulsequah
Mt Ogden
Mt Fremont Morse
Mt Brundage
Mt Juneau
Mt Sumdum
Mt Burkett
Devils Thumb
Kates Needle
Twin Pks
Castle


TONGASS NATIONAL FOREST
JUNEAU WORKING CIRCLE
Working Circle Boundary
Block Boundary
GEORGIA PACIFIC ALASKA CO. SALE
Primary Logging Area
Areas reserved for sale to others
Areas requiring special treatment
1958
SKAGWAY
ATLIN
TAKU RIVER
JUNEAU
SITKA
SUMDUM
Lynn Canal
Frederick
Freshwater
East Admiralty
West Admiralty
Tracy Arm
Stephens Passage
Tenakee
Hoonah
Kelp Bay
Eliza
Farragut
NATIONAL FOREST BOUNDARY
CANADA
UNITED STATES
Mt Bagot
Snow Top
Mt Canning
Mt Poletica
Mt Nesserrode
Mt Ogilvie
Devils Paw
Tulsequah
Mt Ogden
Mt Fremont Morse
Mt Brundage
Mt Juneau
Mt Burkett
Devils Thumb
Mt Gilroy
Kates Needle
Twin Pks
Castle

Juneau Working Circle

Area and Volumes (MBF)
Old Growth Sawtimber (4)
N. F. Accessible Commercial Forest Land 1/

Block	16M & over/acre		8-15.9M/acre		Total	
	Acres	Vol.(MBF)	Acres	Vol.(MBF)	Acres	Vol.(MBF)
1. Taku	29,700	962,000	4,000	52,300	33,700	1,014,300
2. East Admiralty	73,650	2,390,300	9,800	128,400	83,450	2,518,700
3. West Admiralty	133,700	4,332,000	17,700	231,900	151,400	4,563,900
4. Tracy Arm	37,550	1,217,000	4,950	64,800	42,500	1,281,800
5. Skagway	40,600	1,315,000	5,400	70,700	46,000	1,385,700
6. Stephens Passage	62,800	2,035,000	8,300	108,500	71,100	2,143,500
7. Eliza	22,800	739,000	3,000	39,200	25,800	778,200
8. Lynn Canal	47,350	1,534,000	6,250	81,800	53,600	1,615,800
Total W. C.	448,150	14,524,300	59,400	777,600	507,550	15,301,900
Less restrict. areas	28,300	915,750	3,750	49,250	32,050	965,000
2/Net regulated area	419,850	13,608,550	55,650	728,350	475,500	14,336,900

Area and Volumes (MBF)
Old Growth Sawtimber (4)
N. F. Inaccessible Commercial Forest Land 1/

Block	16M & over/acre		8-15.9M/acre		Total	
	Acres	Vol.(MBF)	Acres	Vol.(MBF)	Acres	Vol.(MBF)
1. Taku	16,800	544,300	2,200	28,800	19,000	573,100
2. East Admiralty	21,900	711,350	2,950	38,500	24,850	749,850
3. West Admiralty	47,100	1,526,000	6,100	79,800	53,200	1,605,800
4. Tracy Arm	17,600	570,300	2,400	31,400	20,000	601,700
5. Skagway	20,900	677,200	2,800	36,650	23,700	713,850
6. Stephens Passage	29,600	959,100	3,900	51,000	33,500	1,010,100
7. Eliza	4,000	129,600	600	7,800	4,600	137,400
8. Lynn Canal	20,300	657,700	2,700	35,300	23,000	693,000
Total W. C.	178,200	5,775,550	23,650	309,250	201,850	6,084,800
Less restrict. areas	3,150	101,750	400	5,250	3,550	107,000
3/Net regulated area	175,050	5,673,800	23,250	304,000	198,300	5,977,800

1/ Less reserved areas.

2/ Includes 200 MBF unregulated species.

3/ Includes 90 MBF unregulated species.

Juneau Working Circle

Area and Volumes (MBF)
Young Growth Sawtimber (3)
N. F. Commercial Forest Land 1/

Block	Accessible		Inaccessible		Total	
	Acres	Vol.(MBF)	Acres	Vol.(MBF)	Acres	Vol.(MBF)
1. Taku	7,400	217,400	4,100	120,250	11,500	337,650
2. East Admiralty	2,410	68,300	650	18,450	3,060	86,750
3. West Admiralty	4,450	130,700	1,450	42,500	5,900	173,200
4. Tracy Arm	1,200	35,250	500	14,700	1,700	49,950
5. Skagway	7,300	214,500	3,650	107,000	10,950	321,500
6. Stephens Passage	2,300	67,600	1,050	30,750	3,350	98,350
7. Eliza	1,650	48,500	250	7,350	1,900	55,850
8. Lynn Canal	3,800	111,650	1,550	45,400	5,350	157,050
Total W. C.	30,510	893,900	13,200	386,400	43,710	1,280,300
Less restrict. areas	1,950	57,000	250	7,500	2,200	64,500
Net regulated area	28,560	836,900	12,950	378,900	41,510	1,215,800

Area
Immature and Nonstocked Stands
N. F. Commercial Forest Land 1/ 4/

Block	Accessible			Inaccessible		
	Poles(2)	Seedlings & Saplings(1)	Nonstocked (N)	Poles(2)	Seedlings & Saplings(1)	Nonstocked (N)
1. Taku	1,550	1,500	6,850	900	800	3,200
2. E.Admiralty	900	-	-	290	-	-
3. W.Admiralty	2,150	500	800	750	100	200
4. Tracy Arm	750	600	1,650	350	200	650
5. Skagway	2,050	2,350	3,550	1,050	1,200	1,550
6. Stephens Passage	200	500	-	100	200	-
7. Eliza	450	450	-	50	50	-
8. Lynn Canal	2,150	950	800	900	400	250
Total W. C.	10,200	6,850	13,650	4,390	2,950	5,850
Less rstr.areas	600	450	800	100	50	100
Net reg. area	9,600	6,400	12,850	4,290	2,900	5,750

1/ Less reserved areas

4/ Excludes inventory volumes of 75 MMBF in pole timber & 53 MMBF in nonstocked stand-size classes.

Juneau Working Circle

Area-Volume Check Accessible Commercial Forest Land 1/
Based on Adjusted Indicated Allowable Cut of 179,500 MBF

Stand-size class	Area in Acres 2/	Present Avg. Age	Avg. Age to be cut	Thousand Board Feet: Net Yield per acre 3/	Thousand Board Feet: Tot. Yield Expected	No. Years to Cut: Periodic	No. Years to Cut: Cumulative	Avg. Area to be cut annually
Old Growth ST (4)	475,500	-	-	29.73	14,136,900	78.8	78.8	6,034
Young Growth ST (3)	28,560	100	150	72.74	2,077,454	11.6	90.4	2,462
Poles (2)	9,600	40	140	69.83	670,368	3.7	94.1	2,595
Seedlings & Saplings (1)	6,400	20	120	62.45	399,680	2.2	96.3	2,909
Intermediate Cuts	(67,341)	-	70	12.00	808,500	4.5	100.8	(14,965)
Harvest cuts less than rotation age	(23,400)	-	90	70.62	1,652,500	9.2	110.0	(2,543)
Totals	520,060	-	-	37.97	19,745,402	110.0	110.0	4,728

1/ Average site index 110.
2/ Also 12,850 acres of nonstocked commercial forest land.
3/ Yields from Scribner Scale normal yield tables discounted 22 % for attainable net yield - U.S.D.A. Tech.Bul. No. 412

Area-Volume Check Inaccessible Commercial Forest Land 1/
Based on Adjusted Indicated Allowable Cut of 66,500 MBF

Stand-size class	Area in Acres 2/	Present Avg. Age	Avg. Age to be cut	Thousand Board Feet: Net Yield per acre 3/	Thousand Board Feet: Tot. Yield Expected	No. Years to Cut: Periodic	No. Years to Cut: Cumulative	Avg. Area to be cut annually
Old Growth ST (4)	198,300	-	-	29.69	5,887,800	88.5	88.5	2,241
Young Growth ST (3)	12,950	100	150	72.74	941,983	14.2	102.7	912
Poles (2)	4,290	40	140	69.83	299,571	4.5	107.2	953
Seedlings & Saplings (1)	2,900	20	120	62.45	181,105	2.7	109.9	1,074
Totals	218,440	-	-	33.47	7,310,459	109.9	109.9 4/	1,986

1/ Average site index 110.
2/ Also 5,750 acres of nonstocked commercial forest land.
3/ Yields from Scribner Scale normal yield tables discounted 22% for attainable net yield - U.S.D.A. Tech.Bul. No. 412
4/ Totals only 109.9 due to rounding adjusted indicated allowable cut from 66,459 MBF to 66,500 MBF.

Explanation of Increment Calculations of Present Young Growth Sawtimber and Immature Stands for Juneau Working Circle - 1958

(Rotation 110 years and Site Index 110)

1. Accessible Commercial Forest Land (MBF)

Stand-size Class	Area Acres	Average Present Age	Age at 1/2 Rotation	Net MAI @ 1/2 Rotation	Total MAI (MBF)
Young Growth ST (3)	28,560	100	155	479	13,680
Poles (2)	9,600	40	95	519	4,982
Seedlings & Saplings (1)	6,400	20	75	469	3,002
Total	44,560				21,664

2. Inaccessible Commercial Forest Land (MBF)

Young Growth ST (3)	12,950	100	155	479	6,203
Poles (2)	4,290	40	95	519	2,227
Seedlings & Saplings (1)	2,900	20	75	469	1,360
Total	20,140				9,790

Explanation of Selection of Average Site Index
Juneau Working Circle
1958

Forest inventory did not provide site index data for the second-growth ground plots taken on this working circle. All available plots giving site index classifications of record at the Forest Research Center were evaluated to obtain an average site index for the working circle. The plots classified by location and number as used in computing an average site index are:

	Location	No. Plots	Percent	Average of Group	Weighted Average
1.	Fritz Cove	9	9.3	96	8.93
2.	Douglas Island	2	2.0	90	1.80
3.	Taku Inlet	9	9.2	70	6.44
4.	Pt. Bishop	8	8.2	87	7.13
5.	Killisnoo Is.	6	6.1	122	7.44
6.	Killisnoo Inlet	6	6.1	108	6.59
7.	Killisnoo Is.	6	6.1	105	6.41
8.	Kanalku Bay	19	19.4	106	20.56
9.	Seymour Canal	5	5.1	116	5.92
10.	Mitchell Bay	6	6.1	100	6.10
11.	Bartlett Cove	2	2.0	127	2.54
12.	Pt. Amner	1	1.0	105	1.05
13.	Eagle River	1	1.0	105	1.05
14.	Taku Harbor	2	2.0	65	1.30
15.	Neltuskin Bay	4	4.1	110	4.51
16.	Young Bay	1	1.0	135	1.35
17.	Windfall Harbor	4	4.1	147	6.03
18.	Favorite Cove	3	3.1	90	2.79
19.	Hawk Inlet	1	1.0	90	.90
20.	Pack Creek	3	3.1	153	4.74
	Total 20 areas	98	100	106.35	103.58

The same plots classified in terms of the percentage of total plot area occupied by each site index gives the following:

Site Index	No. Plots	Percent	Weighted Average
60(55-64)	2	2	1.2
70(65-74)	9	9	6.3
80(75-84)	4	4	3.2
90(85-94)	14	14	12.6
100(95-104)	20	21	21.0
110(105-114)	26	27	29.7
120(115-124)	10	10	12.0
130(125-134)	6	6	7.8
140(135-144)	2	2	2.8
150(145-154)	2	2	3.0
160(155-164)	2	2	3.2
170(165-174)	1	1	1.7
Total	98	100	104.5

The above arithmetical and weighted averages based on (1) site index groups and (2) location groups compare as follows:

1. Arithmetical average by:

(1)	Individual plots	103.64 1/
(2)	Location groups	106.35

2. Weighted average by:

(1)	Plots by site index groups	104.5
(2)	Location groups (arithmetical average)	103.58

1/ Total of plot site indexes divided by number of plots.

Harold Anderson, in conducting the 1954 TRR survey, arrived at an average site index of 106 for the northern and 116 for the southern halves of the Tongass. As will be noted from the plot group locations above, group sampling is fairly well distributed over the working circle. While this sampling may not prove to be statistically sound, it provides the only practical means of determining an average site at this time.

The forest inventory report states that a major portion of the second growth stands on this working circle are the result of destructive winds. It may then be assumed that this sampling of them would result in a lower than average site index because of exposed locations and the possibility of shallow soils. Plots in stands resulting from logging are likely to be higher than average but probably are not adequately represented in the samples taken. Then, from this reasoning, it can be assumed that the actual average site index is likely to be somewhat higher than the available plot sampling shows. Therefore, site index 110 will be used.

Explanation of Selection of Rotation Age
Juneau Working Circle
1958

Using an average site index of 110 we find from table No. 16, U.S.D.A. Tech. Bul. No. 412, Forest Plan Appendix page A-7, that the culmination of mean annual increment occurs at an age of 110 years. The difference between culmination of MAI at 100 and 110 years, however, is inconsequential, 672 and 673 board feet respectively. The drop off in increment immediately after age 110 is only slight with an MAI of 666 board feet at age 120. Therefore a rotation age somewhere between 95 and 125 may be selected without sacrificing a satisfactory growth rate.

For strictly wood fiber production a rotation age of 90 or 100 years would be satisfactory. Conversely, if production of quality sawlogs was a major objective of management a rotation of 120 years or more would be more suitable.

Undoubtedly the major industry developed on this working circle will use wood fiber in one form or another. Therefore a rotation age based on the maximum production of wood fiber in reasonable tree size classes is appropriate. From the normal stand tables, Table 18, U.S.D.A. Tech. Bul. No. 412, the lowest, the selected average and the highest site indexes are expected to produce the following stands at a rotation age of 110 years (88% of normal):

Site Index	Total No. Trees Per Acre	Number of Trees				Maximum Diameter (inches)
		7" & over d.b.h.		11" & over d.b.h.		
		Percent	No. Trees	Percent	No. Trees	
70	792	44	348	12	95	14
110	274	90	247	64	175	25
150	123	100	123	96	118	33

From this table it can be seen that the various sites on a rotation of 110 years will produce sufficient trees of a size that can be most economically logged in the foreseeable future. Depending on developed needs of industry as to size and quality the rotation of the poorest and the best sites may be extended or reduced.

It would be purely conjecture to attempt a prediction of quantity and quality needs of sawmills and plywood plants after the old growth sawtimber stands have been depleted -- some 80 years or more hence. Such needs of the minor industries, as later determined, can be met on a pulp rotation by specialty management of the required portion of stands on the better sites. Stands with site indexes of 120 and over show culmination of MAI down to 80 years. Carrying such stands to rotation age, or somewhat beyond, and the employment of stand improvement measures can be expected to provide the quantity and quality of sawlogs needed for the minor industries.

A 110 year rotation best meets these predicted requirements and provides a period for the establishment of reproduction following harvest cuts.

Explanation of Methods Used to Determine Expected Yields From:
Juneau Working Circle
1958

1. Intermediate Cuts (Commercial Thinnings, Sanitation Cuts, etc.)

Not all commercial forest land acreage is favorably situated for making intermediate (partial) cuts under present and foreseeable logging methods. Likewise, not all of the commercial forest land acreage estimated to be favorable to commercial intermediate cuts will reach a suitable age for such cutting during this rotation. One commercial intermediate cut is planned which will be made in 60-80 year old stands of the site, topography and location which will permit partial cutting. The following table indicates the total accessible commercial forest land acreage which is expected to produce immature stands of the required age class, or older, during this rotation:

Present stand-age class	Total Regulated Area (Acres)	Portion of CFL expected to be available	Acres of 60-80 yr. old 2nd growth available 1st rotation
Old growth sawtimber (4)	475,500	1st 50-yr. cut @ 6,000 acres/yr.	300,000
Young growth sawtimber (3)	28,560	1/2 total area	14,280
Poles (2)	9,600	All	9,600
Seedlings & Saplings (1)	6,400	All	6,400
Nonstocked (N)	12,850	1/2 total area	6,425
Total	532,910		336,705 acres

It is estimated that of the total area available in a suitable age class only 20 percent will have topography and accessibility factors favorable for such operations this rotation. Therefore, it is expected that a total of 67,341 acres will be available for commercial intermediate cuts this rotation.

Using stand tables for 70 year old stands with average site index 110 (Tech. Bul. No. 412, page 26) it is estimated as shown below that an average yield of 12 MBF per acre may be realized, principally in the 6" to 10" diameter classes.

DBH Class	No. Trees (88% of Normal) 1/	Vol. per Tree (BF) 2/	Total Volume Expected (BF)
6	56	30	1,680
7	56	40	2,240
8	56	50	2,800
9	49	70	3,430
10	15	80	1,200
Total	232		11,350
		rounded to	12,000 BF

1/ Leaves an average of 135 trees per acre 10" d.b.h. and larger as crop trees for harvest cut at rotation age.

2/ Based on form Class 80 to a 6" top.

Discounted normal stand tables at rotation age for Site Index 110 indicate a stand of 175 trees per acre 11 inches and over d.b.h. By this solution the number of crop trees at rotation age will be reduced to an average of 135 trees per acre. It is being assumed that crop trees in the thinned stands will yield as much volume at rotation age as the stand would have had it not been thinned. This is expected to be true because either (1) crop tree growth will be accelerated as the result of removing 232 trees 6 - 10" d.b.h. per acre, (2) growth rate of crop trees at time of thinning will be maintained whereas growth rate would have declined if the stand had not been thinned, or (3) a combination of the two.

Therefore, it is estimated that a total volume of 808,092 MBF (rounded to 808,500) may be harvested as commercial thinnings and improvement cuttings, principally during the last half of this rotation. By that time markets and developed access roads and logging methods will surely permit this type of intermediate cutting operations.

2. Harvest Cuts of Above Average Site Index Stands at Less than Rotation Age.

A significant volume may be added to the current and subsequent calculations of allowable cuts in this rotation by taking advantage of the better-than-average sites and cutting them twice in the first rotation. (ie. an old growth sawtimber cut followed by a young growth sawtimber cut within the 1st 110 year rotation). Stands on site indexes 130 and higher reach age of culmination of mean annual increment at 80 to 90 years. They will produce an average net volume of about 70 MBF per acre in diameter classes suitable for harvest cutting at an average cutting age of 90 years.

Available acreages and yields for this purpose, then, are developed along the following lines. Not all the estimated acreage of site indexes 130 and over will reach an appropriate cutting age for a second cut in this rotation. Since culmination of M.A.I. of the best sites is about 80 years, it follows that such sites cut over during the first 30 years of the rotation will be ready for the second cut beginning at R minus 30 years over the last 30 years of the rotation. It was determined under this plan that the indicated allowable cut would deplete about 6,000 acres of old growth sawtimber per year, or a total of 180,000 acres in the first 30 years of the rotation. A tabulation of all available plots on which site index has been determined indicates that 13 percent of the total CFL acreage may be classified as site index 130 and higher. On the basis of these assumptions the expected yield from this source is determined as follows:

Site Index	Percent of CFL	Acres Available this Rotation	Culmination MAI	Average Age to be Cut	Net Yield per Acre (MBF)	Total Yield Expected (MBF)
130	6	10,800	90	90	63.04	680,832
140	2	3,600	80	90	71.90	258,840
150 1/	5	9,000	80	90	79.21	712,890
	13%	23,400				1,652,562
					rounded to	1,652,500

1/ No data available from yield tables for site indexes over 150. Plot data indicates 2, 2 and 1 percents for site indexes 150, 160 and 170 respectively -- combined and computed as site index 150.

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